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# The nature of the sensory input to the neonatal rat barrel cortex

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## Abstract

© 2016 the authors.Sensory input plays critical roles in the development of the somatosensory cortex during the neonatal period. This early sensory input may involve: (1) stimulation arising from passive interactions with the mother and littermates and (2) sensory feedback arising from spontaneous infant movements. The relative contributions of these mechanisms under natural conditions remain largely unknown, however. Here, we show that, in the whisker-related barrel cortex of neonatal rats, spontaneous whisker movements and passive stimulation by the littermates cooperate, with comparable efficiency, in driving cortical activity. Both tactile signals arising from the littermate's movements under conditions simulating the littermates' position in the litter, and spontaneous whisker movements efficiently triggered bursts of activity in barrel cortex. Yet, whisker movements with touch were more efficient than free movements. Comparison of the various experimental conditions mimicking the natural environment showed that tactile signals arising from the whisker movements with touch and stimulation by the littermates, support: (1) a twofold higher level of cortical activity than in the isolated animal, and (2) a threefold higher level of activity than in the deafferented animal after the infraorbital nerve cut. Together, these results indicate that endogenous (self-generated movements) and exogenous (stimulation by the littermates) mechanisms cooperate in driving cortical activity in newborn rats and point to the importance of the environment in shaping cortical activity during the neonatal period.

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## Keywords

Barrel, Development, EEG, Neonate, Whisker